

Joshua D Carmichael

Multi-Phenomenological Nuclear Explosion Detection

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Objective	To remain highly visible to the seismic and CTBT monitoring community; to advance and utilize multi-phenomenological detection and discrimination tools; to identify low-yield clandestine weapon tests.
Education	<p>PhD, Geophysics (2013) University of Washington, Seattle, WA</p> <ul style="list-style-type: none">Seismology, Glaciology, Statistical Signal Processing <p>Thesis: Melt-Triggered Seismic Response in Hydraulically-Active Polar Ice: Observations and Methods; <i>Adviser: Ian R Joughin, Applied Physics Laboratory</i></p> <p>Masters of Science, Applied Mathematics (2008) University of Washington, Seattle, WA</p> <ul style="list-style-type: none">Vector Space Projections: Inner Product Choice with Signal Processing Applications <p>Bachelor of Science, Physics (2004) Washington State University, Pullman, WA</p> <ul style="list-style-type: none">Magna Cum LaudeWriting with Distinction
Internships	<p>AltaRock Energy, Seattle WA</p> <ul style="list-style-type: none">Jan-April 2012: Seismic data acquisition, data processing, and deployment of microseismic array <p>ExxonMobil Upstream Research Co., Houston TX</p> <ul style="list-style-type: none">Jun-Sep 2009: Geophysics Division, Quantitative Interpretation, Low Freq and Passive Sources
Technical Skills	<ul style="list-style-type: none">Data: probability, wavelets, correlation/coherency, clustering, array processing, inverse theory, numerical linear algebra, detection & estimation theory, statistical hypothesis testingSeismic: magnitude estimates, source mechanics, hypocentral inversion, multiplet analyses, ray-shooting, wavefield polarization, coda wave analysis, double difference relocationPhysical Modeling: glacial hydrology, elasticity, thermodynamics, associated nonlinear PDEsNumerical: MATLAB, finite difference methods, finite volume methods, PDF estimation
Publication & Communication	<p>Selected First Author Publications and Presentations (<i>more provided on request</i>)</p> <ul style="list-style-type: none">Thesis: Melt-Triggered Seismic Response in Hydraulically-Active Polar Ice: Observations and Methods, University of Washington, 2013Paper: Seismicity of the Western Greenland Ice Sheet, Part I: Surface Fracture in the Vicinity of Active Moulins, <i>The Cryosphere</i>, (<i>submitted</i> 2013)Paper: Seismic Multiplet Response Triggered by Meltwater at Blood Falls, Taylor Glacier, Antarctica, <i>Journal of Geophys. Research</i> doi:10.1029/2011JF002221Technical Manual: Seismic Array Correlation and Clustering with CORAL. Seattle: University of Washington, 2010 (http://earthweb.ess.washington.edu/~joshuadc/RaCorrelationTutorial.pdf)Presentation: Seattle WA (2012). Seismic Detectors: A Noise Adaptive Energy and Correlation Detector (obtain here: http://earthweb.ess.washington.edu/~joshuadc/research.html#C6)Poster: 25 years of Applied Mathematics, Seattle WA (2009). Signal Synthesis with Conic Matching Pursuit, Theory and Application to Seismic Data
Contributions	<ul style="list-style-type: none">Pacific Northwest Seismic Laboratory (2012): Lead design of multiplet detector and estimator for optimal discriminating between glacial and volcanic sources for the Pacific Northwest Seismology Network (PNSN). <i>Contact: Paul Bodin, bodin@uw.edu</i>SEG/EAGE Summer Workshop on Low Frequencies: their value and challenges (2010) Presentation: Mark Meier <i>et al.</i> Method for Evaluating a Low Frequency Source (2nd Author). <i>Contact: Mark Meier, mark.a.meier@exxonmobil.com</i>